JAPANESE [JP,2003-115778,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

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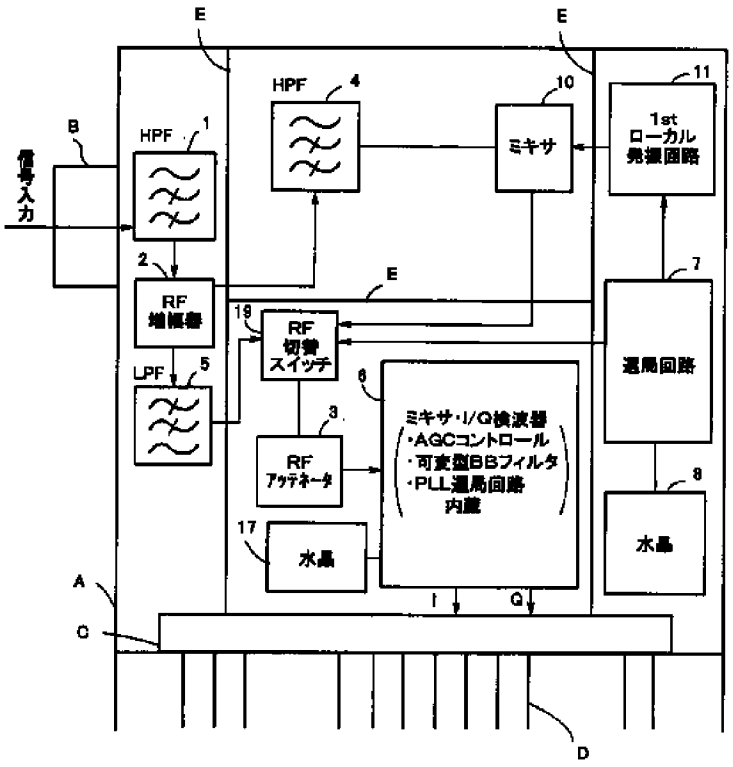
DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]Especially this invention relates to the receiving set for satellite broadcasting about the tuner for satellite reception what enabled communication line service correspondence.
[0002]
[Description of the Prior Art]As a frequency conversion method of the receiving set for satellite broadcasting, although there are a double conversion system and a direct conversion system, in any, a received frequency zone is 950-2150 MHz, and service of a communication line etc. is not supported.
[0003]
[Problem(s) to be Solved by the Invention]It is difficult for each above-mentioned frequency conversion method for the received frequency zone to be designed by 950-2150 MHz, therefore to expand a received frequency zone as it is. If a received frequency zone is only expanded, in an RF circuit, performance degradation can be considered and there is a problem that it cannot respond in expansion of IC receiving

Drawing selection Representative draw



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band currently designed at 950-2150 MHz in a PLL circuit. However, if circuitry is changed and it will become, it will be connected with a cost hike by the circuit which required and carried out the design variation of the time to the design. In the shape of a tuner, in order to enable the function corresponding to communication line service, the addition of a circuit is needed and there is a problem of being different special shape from the old tuner for satellite reception.

[0004]In order to have been made in view of such a situation and to obtain the tuner for satellite reception corresponding to communication line service, this invention, Control of a cost hike is aimed at by expanding a received frequency zone, communalizing circuitry with the conventional thing as much as possible, promoting simplification of a design, and carrying out common use of the component parts.

[0005]

[Means for Solving the Problem]This invention is a tuner for satellite reception corresponding to communication line service, and combines a circuit of a double conversion system and a direct conversion system. This invention makes an outside the same as that of a tuner for satellite reception of the conventional double conversion system in a tuner for satellite reception corresponding to said communication line service.

[0006]This invention sets oscillating frequency of an oscillating circuit added to communication line services as 900 MHz in a tuner for satellite reception corresponding to said communication line service. This invention adopts a PLL circuit as an oscillating circuit added to communication line services in a tuner for satellite reception corresponding to said communication line service.

[0007]This invention divides an RF circuit into the satellite reception zone and communication line zone side in a tuner for satellite reception corresponding to said communication line service. This invention provides a low pass filter in the satellite reception zone side of an RF circuit in a tuner for satellite reception corresponding to said communication line service. This invention provides a highpass filter in the communication line zone side of an RF circuit in a tuner for satellite reception corresponding to said communication line service.

[0008]This invention forms a shield plate in a part which divided an RF signal in an RF circuit into the satellite reception zone and communication line zone side in a tuner for satellite reception corresponding to said communication line service. In a tuner for satellite reception corresponding to said communication line service, this invention divides into two or more circuit blocks a circuit which constitutes a

tuner, and in a shielding case, it arranges said circuit blocks on a substrate so that mutual eye SORENYON may be raised.

[0009]This invention communalizes arrangement of an oscillating circuit and a PLL circuit which were added to communication line services in a tuner for satellite reception corresponding to said communication line service with arrangement of an oscillating circuit in a tuner for satellite reception of a double conversion system, and a PLL circuit. This invention shares crystal required for two PLL circuits in a tuner for satellite reception corresponding to said communication line service.

[0010]

[Embodiment of the Invention]The embodiment of the tuner for satellite reception corresponding to the communication line service by this invention is described below based on a drawing. Here, each received frequency zone and frequency conversion method of the conventional tuner for satellite reception and the tuner for satellite reception corresponding to the communication line service of this invention are explained. Drawing 5 is a figure explaining the relation of the received frequency zone and frequency conversion method of the tuner for satellite reception corresponding to the communication line service of this invention, and the conventional tuner for satellite reception. Drawing 5 (A) shows a received frequency zone, and drawing 5 (B) shows the frequency band obtained by frequency conversion. Although the receiving band of the conventional tuner for satellite reception is BS received frequency zone (950-1350 MHz) and CS received frequency zone (1350-2150 MHz), In this invention, a received frequency zone tends to be expanded to a communication line zone (2150-2600 MHz), and it is going to correspond to communication line service. In the case of the conventional direct conversion system, local frequency is divided into (2) and (725-1075 MHz), and IQ detection is performed. [(1), (950-1450 MHz), and]

[0011]By this invention, it becomes possible to it to receive the communication line frequency band of (3) and (2150-2600 MHz) by providing an oscillating circuit and carrying out frequency conversion once before IQ detection. Although frequency conversion only of this field of (3) and (2150-2600 MHz) will be carried out twice, it becomes possible by stabilizing this oscillating frequency in a PLL circuit to acquire good phase noise figure. When the frequency of the oscillating circuit added before IQ detection is set as 900 MHz, for example a communication line frequency band (2150-2600 MHz), It is changed into (1250-1700 MHz) by the 1st frequency conversion, and about the 2nd frequency conversion, local frequency is divided into (725-850 MHz) and (1250-1450 MHz), and

results in IQ detection. The oscillating frequency (900 MHz) of the oscillating circuit before IQ detection and its harmonics (1800 MHz) do not agree with the frequency after a received frequency zone and the first frequency conversion, and local frequency, and do not turn into an interference.

[0012]About the change of a satellite reception zone (950-2150 MHz) and a communication line zone (2150-2600 MHz), it corresponds with the I/O Port of PLLIC currently used for a channel selection circuit. This invention takes in a direct conversion system to arrangement of each circuit block [in / for the shape of the tuner for satellite reception corresponding to communication line service, and arrangement of a circuit block / the tuner for satellite reception of the conventional double conversion system], and adds improvement to it. Then, the composition of the tuner for satellite reception of the conventional double conversion system and the tuner for satellite reception of a direct conversion system is explained first.

[0013]Drawing 3 is a figure showing the sample layout in the case of the tuner for satellite reception of the conventional direct conversion system. As for an input terminal and C, A is [the shielding case of the tuner for satellite reception, and B / a terminal pin and E of a terminal and D] shield plates. As shown in a figure, greatly each circuit which constitutes the tuner for satellite reception of a direct conversion system The highpass filter (HPF) 1 and RF amplifier 2, Division arrangement is carried out and shield plate E is provided in the block which consists of RF attenuator 3, an automatic gain control (AGC), a good transformation B.B filter, a mixer and an I/Q wave detector 6 with a built-in PLL channel selection circuit, and the crystal 17 between them.

[0014]Drawing 4 is a figure showing the sample layout in the case of the tuner for satellite reception of the conventional double conversion system. The same numerals are given to the same thing as the component of the tuner for satellite reception of the conventional direct conversion system shown in drawing 3. As for an input terminal and C, A is [the shielding case of the tuner for satellite reception, and B / a terminal pin and E of a terminal and D] shield plates. The circuit block which consists of the highpass filter (HPF) 1 and RF amplifier 2, The circuit block which consists of RF attenuator 3, the band pass filter (BPF) 9, the mixer 10, and the low pass filter (LPF) 12, The circuit block which consists of IF amplifier 13, the band pass filter (BPF) 14, the amplifier 15, mixer [with a built-in automatic gain control (AGC)], and I/Q wave detector 6', and the 2nd local oscillator 16, It is divided into the circuit block which consists of the 1st local oscillating circuit 11, the channel

selection circuit 7, and the crystal 8, and shield plate E is provided between each circuit block.

[0015]Drawing 1 is a figure showing the layout of the circuit block in one example of the tuner for satellite reception corresponding to the communication line service of this invention. The same numerals are given to the same thing as the component of drawing 3 and the conventional tuner for satellite reception shown in 4. As for an input terminal and C, A is [the shielding case of the tuner for satellite reception, and B / a terminal pin and E of a terminal and D] shield plates. The circuit block which consists of the highpass filter (HPF) 1, RF amplifier 2, and the low pass filter (LPF) 5, The circuit block which consists of the highpass filter (HPF) 4 and the mixer 10, The circuit block which consists of the RF changeover switch 19, RF attenuator 3, an automatic gain control (AGC), a good transformation BB filter, a mixer and an I/Q wave detector 6 with a built-in PLL channel selection circuit, and the crystal 17, It is divided into the circuit block which consists of the 1st local oscillating circuit 11, the channel selection circuit 7, and the crystal 8, and shield plate E is provided between each circuit block.

[0016]The layout of each circuit block in the case of the tuner for satellite reception corresponding to the communication line service concerning this invention so that clearly from a figure, Mixer [with a built-in automatic gain control (AGC)], and I/Q wave detector 6' in the layout of the circuit block in the tuner for satellite reception of the double conversion system shown in drawing 4, In the position of the circuit block which consists of the 2nd local oscillator 16, the B.B filter 18 and IF amplifier 13, the band pass filter (BPF) 14, and the amplifier 15. A mixer, the I/Q wave detector 6, and the crystal 17 with a PLL channel selection circuit the automatic gain control (AGC) which is IQ detector circuit of the direct conversion system shown in drawing 4, a good transformation B.B filter, and built-in are arranged. Therefore, it can adopt as it is as a tuner for satellite reception corresponding to the communication line service of this invention, without changing the layout of the circuit block used for the tuner for satellite reception of the conventional double conversion system.

[0017]At the time of a channel selection, it is considered so that oscillating frequency may not serve as an interference, but since a communication line frequency band serves as an interference when a satellite reception frequency band is tuned in, it needs to raise the isolation characteristic by the side of a satellite reception zone and a communication line zone here. Since this can solve an RF circuit by making it dissociate certainly by the satellite reception zone and communication line zone side, it branches the circuit after

RF amplifier 2 to a satellite reception zone and a communication line zone, The highpass filter (HPF) 4 was added to the satellite reception zone side at the low pass filter (LPF) 5 and communication line zone side, and also the broadcast receiving band and communication line zone side is separated by shield plate E. The composition of the highpass filter (HPF) 1, RF amplifier 2, the low pass filter (LPF) 5, and the highpass filter (HPF) 4 enables it to raise an isolation characteristic more.

[0018]An automatic gain control (AGC), a good transformation BB filter, He is trying to prevent the adverse effect to reception by an interference from I/QIC which constitutes a mixer and the I/Q wave detector 6 with a built-in PLL channel selection circuit by inserting the RF changeover switch 19 of a satellite reception zone and a communication line zone in the preceding paragraph. Although degradation of an input VSWR characteristic can be considered by having expanded the received frequency zone, by separating an RF circuit, as described above, the receiving band of each RF circuit becomes narrow, and reservation of performance becomes easy.

[0019]Next, operation of the tuner for satellite reception corresponding to the communication line service concerning this example is explained. First, the RF signal inputted into the input terminal B lets the highpass filter (HPF) 1 pass, After being inputted into RF amplifier 2 and amplified, it lets the highpass filter (HPF) 4 pass, and it is led to the mixer 10, the RF signal of a communication line zone is mixed with the dispatch signalling frequency from the 1st local oscillating circuit 11, and frequency conversion is carried out. The RF signal of the communication line zone by which frequency conversion was carried out, Via the RF changeover switch 19 changed by the output from the channel selection circuit 7, it is led to an automatic gain control (AGC), a good transformation BB filter, and a mixer and an I/Q wave detector 6 with a built-in PLL channel selection circuit after passing RF attenuator 3, and an I signal and a Q signal are outputted. On the other hand, among the RF signals inputted into the input terminal B, the RF signal of a satellite reception zone, Are inputted into RF amplifier 2 through the highpass filter (HPF) 1, and after being amplified, it lets the low pass filter (LPF) 5 pass, The RF changeover switch 19 is changed by the output from the channel selection circuit 7, it is led to an automatic gain control (AGC), a good transformation BB filter, and a mixer and an I/Q wave detector 6 with a built-in PLL channel selection circuit, and an I signal and a Q signal are outputted.

[0020]Drawing 2 is a figure showing arrangement of the circuit block in other examples of the tuner for satellite

reception corresponding to the communication line service of this invention. This circuit block omits the crystal 17 in the circuit block shown in drawing 1, is the point which is sharing the crystal 8 with the crystal 17, and is different from a front example. In two PLL circuits built in in this way, the cost hike by an option is reduced by attaining common use of crystal.

[0021]

[Effect of the Invention]According to this invention, it becomes possible by combining the circuit of a double conversion system and a direct conversion system to expand a received frequency zone. According to this invention, while being able to attain communalization of the conventional tuner for satellite reception, and a mechanism element by making shape the same as that of the tuner for satellite reception of the conventional double conversion system, the design by the side of SETTOP BOX also becomes comparatively easy.

[0022]According to this invention, it becomes possible to prevent oscillating frequency becoming a disturbance signal by setting the oscillating frequency of the oscillating circuit added to communication line services as 900 MHz. According to this invention, after frequency conversion becomes possible [acquiring good phase noise figure] by adding a PLL circuit to the oscillating circuit added to communication line services.

[0023]According to this invention, it becomes possible by dividing an RF circuit into the satellite reception zone and communication line zone side to raise the isolation characteristic of a satellite reception zone and a communication line zone. According to this invention, it becomes possible by providing a low pass filter in the satellite reception zone side of an RF circuit to raise an input VSWR characteristic when the satellite reception zone side is chosen.

[0024]By providing a highpass filter in the communication line zone side of an RF circuit according to this invention, When the satellite reception zone side is chosen, it becomes possible to raise an input VSWR characteristic when the controlling-that oscillating frequency [by the side of a communication line zone] and its harmonics become disturbance signal and communication line zone side is chosen. According to this invention, it becomes possible to raise the isolation characteristic of a satellite reception zone and a communication line zone by forming a shield plate in the part which divided the RF signal in said RF circuit into the satellite reception zone and communication line zone side.

[0025]By according to this invention, dividing into two or more circuit blocks the circuit for which a tuner is

constituted, and arranging on a substrate so that said circuit block may raise a mutual isolation in a shielding case, It becomes possible to inhibit the adverse effect to reception by the interference which generates a required signal by interference with other circuit signals. According to this invention, it becomes possible to raise design efficiency by communalizing arrangement of the oscillating circuit and PLL circuit which were added to communication line services with arrangement of the oscillating circuit of the tuner for satellite reception of a double conversion system, and a PLL circuit. According to this invention, it becomes possible by sharing crystal required for two PLL circuits inside a tuner to reduce the cost hike by circuit addition.

[Translation done.]